Brucellosis

(Also known as Bangs Disease, Undulant Fever, Malta Fever and Mediterranean Fever)

Immediately Reportable

November 2003

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Brucella bacteria cause brucellosis. The species of *Brucella* which infect humans are *B. abortus, B. melitensis, B. suis*, and rarely*, B. canis.*

B. Clinical Description and Laboratory Confirmation

The symptoms of brucellosis may be nonspecific including sustained or irregular fever of variable duration, headache, weakness, sweats, chills, arthralgias, malaise, weight loss, depression and generalized aching. Onset of illness may be acute or insidious. Localized infections of organs (including the liver and spleen) and chronic localized infections can occur. The disease may last for days, months, or occasionally longer if inadequately treated. Relapse is not uncommon. Complications affecting the joints are common, as is genitourinary involvement, including orchitis and epididymitis. The case-fatality ratio of untreated brucellosis is ≤ 2%. However, death often results from endocarditis caused by *B. melitensis*.

Laboratory diagnosis is made by isolation of *Brucella* from blood, bone marrow, and other tissues, or from patient discharges. Serological tests (ELISA, agglutination test) are valuable especially when paired sera show a rise in antibody titer. Most cases of active infection have titers higher than 1:160.

C. Reservoirs

Cattle, swine, goats and sheep are the most common reservoirs. Bison, elk, caribou, and some species of deer may also harbor *Brucella* species. *B. canis* is an occasional problem in laboratory dog colonies and kennels; a small percentage of pet dogs and a higher proportion of stray dogs have *B. canis* antibody titers. Coyotes have also been found to be infected.

D. Modes of Transmission

Brucellosis is spread through direct contact (of mucosal surfaces and cuts and abrasions of the skin) with secretions of living or dead infected animals, including their tissues, blood, urine, vaginal discharges, aborted fetuses, and placentas. It may also be spread through ingestion of raw milk and dairy products (*e.g.,* unpasteurized cheese) from infected animals. Airborne transmission may occur through inhalation of contaminated aerosols (*e.g.,* in laboratory settings). Persons may also be infected through accidental inoculation with live brucella vaccine-strain used for livestock (strain 19). Person-to-person spread is extremely rare, although it has been reported to occur through bone marrow transplantation.

E. Incubation period

The incubation period for brucellosis is highly variable, ranging from 5 to 60 days; illness most commonly occurs about 1 month after exposure.

F. Period of Communicability or Infectious Period

Person-to-person transmission of brucellosis is extremely rare.

G. Epidemiology

Humans are accidental hosts, although there is worldwide distribution of brucellosis. It is more commonly seen as an occupational disease in farmers, ranchers, veterinarians, and other people who work directly with animals. It may also be found in people who work in laboratories and slaughterhouses, and in meat inspectors. Sporadic cases and outbreaks may occur among consumers of raw (unpasteurized) milk and milk products, especially soft cheeses. Fewer than 120 cases per year are reported in the United States; incidence worldwide may be largely unrecognized and underreported. In the last 12 years, five cases of brucellosis were reported to the New Jersey Department of Health and Senior Services (NJDHSS).

H. Bioterrorist Potential

Brucella species are considered potential bioterrorist agents and could cause a serious public health challenge in terms of ability to limit the numbers of casualties and to control other repercussions from such an attack.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

CASE CLASSIFICATION

CONFIRMED

Clinically diagnosed case, **AND**

- Isolation of *Brucella sp*. from a clinical specimen*,* **OR**
- Fourfold or greater rise in Brucella *sp.* agglutination titer between acute and convalescent-phase serum specimens obtained $\geq$ 2 weeks apart and tested in the same laboratory, **OR**
- Demonstration by immunofluorescence of *Brucella sp.* in a clinical specimen.

PROBABLE

- Clinically compatible case that is epidemiologically linked to a confirmed case, **OR**
- A clinically compatible case that has supportive serology (i.e., *Brucella sp.* agglutination titer of greater that or equal to 1:160 in one or more serum specimens obtained after onset of symptoms).

POSSIBLE

Not used.

B. Laboratory Testing Services Available

The Public Health and Environmental Laboratories (PHEL) provide confirmatory testing services for all referred isolates of suspected *Brucella* species from appropriate clinical specimens and can perform serological testing for *Brucella spp.* Contact with the Division of Epidemiology, Environmental and Occupational Health Services Infectious and Zoonotic Diseases Program at 609.588.3121 must occur prior to submitting suspected isolates of *Brucella* species to the PHEL Laboratories. PHEL can also ask laboratories to submit isolates cultured for further identification to aid in the public health surveillance necessary for this illness. The mailing address is: **NJDHSS, Division of Public Health and Environmental Laboratories, Specimen Receiving and Records, P.O. Box 361, John Fitch Plaza, Trenton, NJ 08625-0361.**

For more information on submitting samples contact the PHEL at 609.292.8396.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To help identify the source of infection and prevent further transmission from this source (*e.g.,* an infected animal, a contaminated unpasteurized dairy product, etc.).
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that health care providers and laboratories **immediately report** (by telephone, confidential fax, over the Internet using Communicable Disease Reporting System [CDRS]) any suspect or known case of brucellosis to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located.
If this is not possible, call the NJDHSS Infectious and Zoonotic Diseases Program (IZDP) at 609.588.3121 during business hours, 609.392.2020, after business hours, on weekends and holidays.

C. Local Department of Health Reporting and Follow-up Responsibilities

1. **Reporting Requirements**
   The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report the occurrence of any case of brucellosis, as defined by the reporting criteria in Section 2 A above. Current requirements are that cases be **immediately reported** to NJDHSS IZDP. A report can be filed electronically over the Internet using the confidential and secure CDRS.
2. **Case Investigation**
   a. **The most important step a local health officer can take if he/she learns of a suspect or confirmed case of brucellosis, or any suspected exposure that is bioterroristic in nature, is to call the NJDHSS immediately, any time of the day or night.** The daytime phone number of the IZDP is 609.588.3121. The phone number for nights and weekends is 609.392.2020.

   b. The NJDHSS will direct brucellosis case investigation of New Jersey residents. If a bioterrorist event is suspected, the NJDHSS in conjunction with CDC and other response authorities will work closely with local health officer(s) and provide instructions/information on how to proceed.

   c. Following immediate notification of the NJDHSS IZDP, the local health officer(s) may be asked to assist in investigating patients that live within their community, including gathering the following information:
      1) The patient's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
      2) The name and phone number of the hospital where the patient is or was hospitalized.
      3) The name and phone number of the patient's attending physician.
      4) The name and phone number of the infection control official at the hospital.
      5) If the patient was seen by a healthcare provider before hospitalization, or was seen at more than one hospital, be sure to document these names and phone numbers as well.

   d. The local health officer(s) may be asked to assist in completing a CDS-1 form. The report may also be filed electronically over the Internet using CDRS. Most of the information required on the form can be obtained from the healthcare provider or the medical record. Use the following guidelines in completing the form:
      1) Be sure to record the patient's full name, full address, date of illness onset, symptoms information and therapy information accurately.
      2) Complete diagnostic test information as requested on the form.
      3) Exposure history: use the incubation period range for *Brucella* (5–60 days). Specifically, focus on the period beginning a minimum of 5 days prior to the case's onset date back to no more than 60 days before onset for the following exposures:
         a. Animal contact (*e.g.,* cattle, swine, goats and sheep) including farm or ranch tours, petting zoos, etc.

b. Occupation (*e.g.,* farmer, laboratory worker.)
c. Travel outside of United States.
d. Food consumption history (use of raw milk or raw milk products including aged cheese from cattle, goats and sheep). Use the second side of the form to record this information.

4) If you suspect that the patient became infected through milk (or other food), the NJDHSS Food and Drug Safety Program should be notified at 609.588.3123. This information is entered into a database, to help link other complaints from neighboring towns, thus helping to identify a foodborne illness outbreak.
5) Ask questions regarding exposure to the *Brucella* vaccine to determine other sources of exposure.
6) Confirm that the laboratory where the culture was identified exercised the proper precaution when working with the bacteria. Infectious aerosols can occur when manipulation of the isolate is done outside of a biosafety hood. Laboratory workers exposed to these aerosols should take preventive antibiotics. (See Section 4 C below).
7) If there have been several attempts to obtain patient information (*e.g.,* the patient or healthcare provider does not return calls or respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely. **If CDRS is used to report, enter the collected information into the "Comments" section.**

After completing the form, it should be faxed to the NJDHSS IZDP, fax number 609.631.4863, or the report can be filed electronically over the Internet using the confidential and secure CDRS. Call the IZDP at 609.588.3121 to confirm receipt of your fax.

e. Institution of disease control measures is an integral part of case investigation. It is the responsibility of health officers to understand, and, if necessary, institute, the control guidelines listed below in Section 4, "Controlling Further Spread."

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

None.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases. Follow drainage or secretion precautions if the case has draining lesions followed by disinfection of purulent discharges. Licensed brucella vaccines are currently available only for livestock.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If more than one case of brucellosis is reported or suspected in a city or town, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle, such as unpasteurized milk products or infected animals, should be sought and applicable preventive or control measures should be instituted (*e.g.,* removing an implicated food item from the environment). Consult with the NJDHSS IZDP at 609.588.3121 (weekdays), or 609.392.2020 (emergency number for nights/weekends) as soon as possible. The Program staff can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

Note: If a bioterrorist event is suspected, the NJDHSS and other response authorities will work closely with local health officers and provide instructions/information on how to proceed.

Exposure of a Laboratory Worker
Laboratory workers exposed to *Brucella* (*e.g.,* did not use the protection of a laminar air flow/biosafety hood), should consider pursuing one of the 3 following options:

- Do nothing but watch for symptoms (and consult with a healthcare provider if symptoms appear);
- Obtain prophylatic treatment (for 3 weeks with doxycycline and rifampin);
- Obtain an acute serum followed by a convalescent serum 3 weeks later. This third option can be pursued with or without treatment.

Consult with the NJDHSS IZDP at 609.588.3121.

D. Preventive Measures

Environmental Measures
Implicated food items must be removed from the environment. A decision about removing implicated food items from the environment can be made in consultation with the NJDHSS Food and Drug Safety Program, reachable at 609.588.3123.

Note: The role of the Food and Drug Safety Program is to provide policy and technical assistance with the environmental investigation such as interpreting the New Jersey Food Code, conducting a hazardous analysis and critical control point (HACCP) risk assessment, initiating enforcement actions, and collecting food samples.

Preventive Measures/Education
To prevent future exposures, advise the following:

- Restrict consumption of milk products made from raw milk (*e.g.,* imported cheeses).
- Workers at occupational risk (such as farmers, slaughterhouse workers, meat processors or butchers) should know symptoms of the disease, how it is spread, and the risks of handling infected animal carcasses and products. They should know the proper way to reduce exposure, such as ventilating slaughterhouses and handling carcasses carefully. For more information refer to the USDA, Animal and Plant Health Inspection Service (APHIS) website at **www.aphis.usda.gov**.
- Hunters should use barrier protection (gloves or clothing) when dressing wild pigs and burying the remains.
- Animal placentas, fetuses, and/or discharges from an animal should be carefully handled and properly disposed. Contaminated areas should be properly disinfected.

Local officials and farmers should search for infection among livestock and eliminate infected animals. In areas of high prevalence, immunization of livestock may be appropriate. Ultimate control of human brucellosis relies on eliminating the disease in domestic animal populations.

ADDITIONAL INFORMATION

A *Brucellosis Fact Sheet* can be obtained at the NJDHSS website at http://www.state.nj.us/health/cd/f_brucello.htm.

The formal CDC surveillance case definition for brucellosis is the same as the criteria outlined in Section 2 A of this chapter. CDC case definitions are used by the state health departments and CDC to maintain uniform standards for national reporting. For reporting to the NJDHSS, always refer to Section 2 A.

REFERENCES

American Academy of Pediatrics. 2000 Red Book: Report of the Committee on Infectious Diseases, 25th Edition. Illinois, Academy of Pediatrics, 2000.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. MMWR. May 2, 1997; Vol. 46: RR-10.

CDC Website. Brucellosis. Available at <http://www.cdc.gov/od/oc/media/fact/brucello.htm>. Updated February 2000.

CDC. Diagnosis and Management of Foodborne Illnesses. A Primer for Physicians. MMWR, 2001; 50:RR-2

Chin, J., ed., Control of Communicable Diseases Manual, 17th Edition. Washington, DC, American Public Health Association, 2000.

Massachusetts Department of Public Health, Division of Epidemiology and Immunization. Guide to Surveillance and Reporting. Massachusetts Department of Public Health, Division of Epidemiology and Immunization, January 2001.